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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,298	09/17/2003	Michael C. Green	005513P018	5448

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EXAMINER	
LE, THAO X	
ART UNIT	PAPER NUMBER
2814	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,298	GREEN ET AL.	
	Examiner	Art Unit	
	Thao X. Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37,49 and 50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37,49 and 50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 49-50 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 02/067014 to Harel et al.

Regarding claim 49, Harel discloses a photodetector in fig. 14, comprising: a plurality of semiconductor materials forming a heterojunction, the plurality of semiconductor materials comprising: a first semiconductor material 4; a second semiconductor material 5 coupled to the first semiconductor material 4, the first and second semiconductor materials being halides, page 30 second and third paragraphs, wherein at least one of the first and second semiconductor materials consists essentially of a semiconductor material.

Regarding claim 50, Harel discloses the photodetector wherein the first semiconductor 4 comprises a lead iodide compound, page 30 line 23 and the second semiconductor material comprises mercuric iodide, page 30 line 28.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1- 5, 7-13, 16-19, 27-29, 49-50 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6995375 to Sato et al.

Regarding claims 1, 49, Sato discloses a photodetector in fig. 11, comprising: a plurality of semiconductor materials 21/7, forming a heterojunction (first material is different from the second material, see claim 20), the plurality of semiconductor materials comprising: a first semiconductor material 21, col. 13 line 12; a second semiconductor material 7, col. 8 line 65, coupled to the first semiconductor material 21, the first and second semiconductor materials being halides, wherein at least one of the first and second semiconductor materials consists of a semiconductor material.

Regarding claims 2-4, 18, 50, Sato discloses the photodetector wherein the first and second semiconductor materials have approximately the same band gap (similar material), wherein the first material 21 comprises an lead iodide compound and the second semiconductor material comprises mercuric iodide, see claims 17 and 20.

Regarding claim 5, Sato discloses the photodetector further comprising: a first contact 3, col. 3 line 14; and a second contact 9, col. 14 line 23, wherein the first plurality of semiconductor materials are disposed between the first and second contacts, fig. 11.

Regarding claim 7, Sato discloses the photodetector wherein second semiconductor material comprises mercuric iodide and the first semiconductor material 21 is less chemically reactive than mercuric iodide with the contacts.

With respect to "the first semiconductor material 21 is less chemically reactive than mercuric iodide with the contacts ", Sato discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 8-13, 19 Sato discloses the photodetector wherein the second semiconductor 7 (1mm, col. 13 line 44) is thicker than the first semiconductor material 21, fig. 11, wherein the first semiconductor material 21 has a thickness of about 1 micron, col. 9 line 65.

Regarding claims 16-17, Sato discloses the photoconductor wherein the second semiconductor material 7 has a conductivity type different than the first semiconductor material 21 (different doping), wherein the band gap of the first and second semiconductor materials are within 10 percent of each other.

With respect to "are within 10 percent of each other ", Sato discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 27-29, Sato discloses the photodetector is coupled to a negative bias, wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage, fig. 11.

Regarding claim 30, Sato discloses a photodetector in fig. 11, comprising: a first semiconductor material 21; a second semiconductor material 7 coupled to the first semiconductor material 21 forming a heterojunction structure; wherein at least one of the first and the second semiconductor materials consists of a semiconductor material, a contact 9 coupled to the second semiconductor material 7, wherein the first and second semiconductor materials comprise means for reducing a chemical reaction with the contact; and means for reducing dark current in the heterojunction structure, col. 4 line 38.

With respect to "means for reducing chemical reaction with the contact", Sato discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claim 31, Sato discloses a photodetector in fig. 11, comprising: a first semiconductor material 21; and a second semiconductor material 7 coupled to the first semiconductor material 21; wherein at least one of the first and the second semiconductor materials consists of a semiconductor material; a contact 9 coupled to the second semiconductor material 7; wherein the second semiconductor material is less corrosive than the first semiconductor to the contact.

With respect to "the second semiconductor material is less corrosive than the first semiconductor to the contact ", Sato discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 32-36, Ikeda discloses the photoconductor wherein the first and second semiconductor materials are halides or iodide, wherein the second semiconductor material is mercuric iodide, see claim 20.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6995375 to Sato et al. in view of US 6353229 to Polischuk et al.

Regarding claim 6, Ikeda discloses the photodetector wherein at least one of the first and second contacts comprise ITO or aluminum, col. 6 line 61.

But Ikeda does not disclose the photodetector wherein at least one of the first and second contacts comprise palladium.

However, Harel discloses the photodetector electrode consisting of ITO or palladium, see claim 18 and 19; and Polischuk discloses the photodetector electrode consisting of palladium, ITO, or Au col. 5 lines 54-57. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the electrode teaching of Polischuk to replace the Au electrode of Sato, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

8. Claim 14-15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6995375 to Sato et al. in view of US 6949749 to Tokuda et al.

Regarding claims 14-15 and 20, Sato does not discloses the photodetector wherein the plurality of semiconductor material further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material

However, Tokuda discloses the photodetector in fig. 3 comprising a plurality of first semiconductor material 12a/b (blocking layer) and second

semiconductor 13 and third semiconductor 12a/b including lead iodide, mercury iodide, and heterojunction, col. 6 line 63 and col. 4 line 42. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of Tokuda with Sato, because it would have improved the sensitivity of the photo conversion layer (SN ratio) as taught by Tokuda, col. 7 lines 19-23.

9. Claims 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6995375 to Sato et al. in view of US 6949750 to Tsutsui et al.

Regarding claims 21-26, 37, Sato discloses the photodetector wherein at least one of the first and second semiconductor materials comprises iodide compound, wherein the second semiconductor material 7 comprises mercuric iodide or lead iodide, see claim 20.

But Sato does not disclose the first semiconductor material comprises bismuth iodide or thallium bromide.

However, Tsutsui discloses a photo conversion layer 4 can include various materials such as bismuth iodide, thallium bromide, lead iodide, or mercury iodide, col. 6 lines 17-30. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the photo conversion material teaching of Tsutsui to replace the photo conversion material electrode of Ikeda, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

12 Jan. 2007

THAO X. LE
PRIMARY PATENT EXAMINER